SOIL CONSERVATION

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THE ORGANIZATION MEETS THE PEOPLE ON THE LAND

By R. H. MUSSER [1]

BEHIND the welter of paper work—the letters, work plans, organization charts—lie concrete realities: The land and the people. Floods, erosion, and submarginal land are very real things. The rural slums that breed on impoverished, misused land are not theories. We must never let the paper on our desks obscure the hard, cold facts with which we have to deal. Never must we lose sight of our primary concern—the land and the people.

To do the job efficiently—with a minimum of useless paper manipulation and a maximum of actual field operation—is the purpose of the Service's organization, as I see it. And I see the Service with mud on its feet. I see the organization as a group of men actually at work on the land and with the people—men of youthful vision and good judgment whose feet are so definitely on the ground that they often sink a little way into it. These men have a sharp sense of reality. While they dream of things as they ought to be, in action they cope always with things as they are. They realize the necessity for paper work, for definite procedures and administrative channels, but they realize, too, that both the paper and the administrative set-up are of a facilitating nature, designed to accomplish certain tangible objectives in the field.

The Job To Be Done

Added duties and responsibilities granted the Service since October 6, 1938, now mean a consolidation in the Service of all erosion-control, water-facility, flood-control, submarginal-land purchase and development and farm-forestry activities of the Department in order to provide a comprehensive land-utilization and conservation service for all but forest and wildlife lands.

Thus, the Service's broadened field program includes many different lines of action—each with its own immediate objective. But it is evident, too, that these different lines of action have a common purpose: "The betterment of human welfare, the conservation of natural resources, the establishment of a permanent and balanced agriculture, and the reduction of the hazards of floods and siltation." Experience, observation, and common sense all dictate the wisdom of weaving the varied lines of action together into one strong fabric, thus avoiding duplication of effort, assuring community of action, and reducing overhead.

After all, the problems we face are not separate and distinct. In the field, we find that the problems and their probable solutions blend into each other so that it is hard to tell, for example, where erosion control leaves off and flood control begins, or where water

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conservation leaves off and the development of water facilities begins.

I have in mind our erosion control demonstration area in the Gilmore Creek watershed, just south of Winona, Minn. It is an effective demonstration chiefly for two reasons: (1) It is small and compact, including only 5,900 acres; and (2) all save one of the 56 farmers in the watershed have cooperated in the demonstration. Close to 100 percent of the area is now protected by contour strip-cropping, good crop rotations, the exclusion of grazing animals from timbered hillsides, the assignment of different use intensities for different areas. Twenty-nine soil-saving practices have been merged into a single protective program that practically blankets the area.

These practices have done a remarkable soil-saving job since their application, as the farmers themselves will tell you. The rate of accelerated erosion—formerly so serious that several farmers could plainly see the end of their farming careers just a few years ahead—has been reduced to a small fraction of its old speed. But the benefits of the program cannot be measured entirely in terms of soil saved, for they extend also to the control of floods in lower Gilmore Valley and to the reduction of siltation in Lake Winona, into which Gilmore Creek drains.

Let me cite an example. On June 19, 1937, a rain of approximately 1.7 inches fell in about 1 hour's time in the Gilmore Creek watershed and surrounding areas, climaxing a series of rains which had left the soil well saturated. Investigations conducted by Soil Conservation Service staff members immediately after the rain revealed that, while considerable flood damage had been done in Pleasant Valley, West Burns Valley, and other neighboring watersheds, no flood at all had occurred in Gilmore Valley. The neighboring streams had gone out of their banks while Gilmore Creek had no more than half filled its channel.

Despite the intensity of the rain, the erosion damage in Gilmore Valley's strip-cropped fields was relatively slight—less than the damage formerly caused by rains of one-fourth that intensity. Silt being carried into Lake Winona by the flood waters from the watershed was markedly less in volume than that poured down after storms much less severe before the demonstration was started.

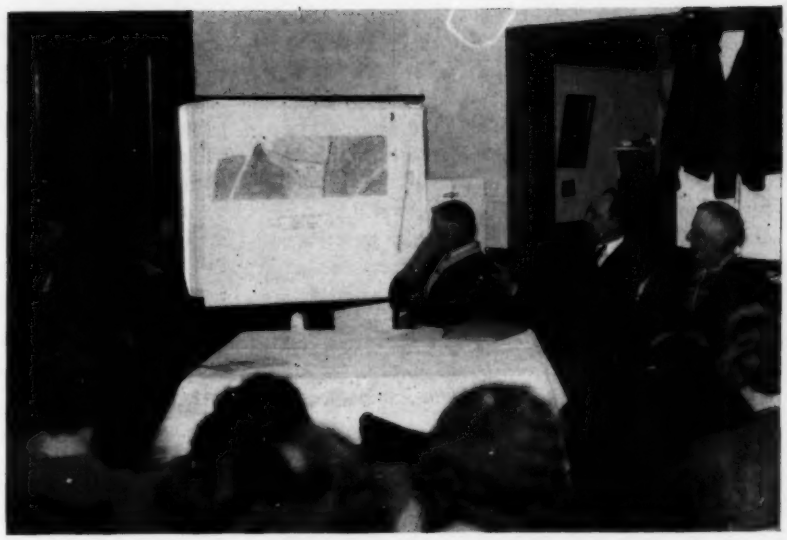
Thus, during that one storm the soil-erosion control program not only saved soil but also reduced run-off, prevented a serious flood, and protected a city's resort lake against the clogging effects of erosion debris.

Similarly, in the soil-conservation demonstration project near Carbondale, Ill.—where a dam across Crab Orchard Creek will form a 6,900-acre lake, and land unsuited to agriculture has been acquired by the government for other uses—the farm conservation plans already in operation there collectively accomplish several supposedly "different" objectives. These farm conservation plans have been formulated in keeping with a program wherein submarginal land has been retired from cultivation; erosion on uplands is being controlled through tree plantings and small gully control structures; reduction of erosion will reduce lake siltation; and—eventually—land developed by the government for pasture may be leased to neighboring farmers to supplement existing farm units.

Organizing To Do the Job

The nature of the job to be done—the fact that in the field are a number of work programs tending to

Group of farmers in the Burns-Homer-Pleasant soil conservation district listening to Conservationist Stanley explaining a map from which a soil conservation plan will be developed.



Panel discussion of complete farm plan on Harry Debes farm, in Iowa. Forty-eight cooperators and 145 others participated in a series of 7 meetings held in the Farmersburg-McGregor project early in 1939.

merge into each other and that the same techniques are employed to achieve different immediate objectives—has in a large measure determined the form of Soil Conservation Service organization.

Study our field activities and you will notice that the several work programs—erosion control, water facilities, etc.—have more in common than the different techniques employed *within* those programs. What I mean is that erosion and water facilities, as separate programs, resemble each other more closely than do, say, the techniques of engineering and forestry. Moreover, these *same* techniques of engineering and forestry are employed in *both* programs. Similarly, the submarginal-land development and erosion-control programs resemble each other more closely than do agronomy and wildlife management, but *both* agronomy and wildlife management are employed in the two work programs.

Given, then, (*a*) *similar work programs sharing common broad objectives* and (*b*) a *multiplicity of widely differing techniques*, how should the Soil Conservation Service be organized? Thus the organization problem has been presented to us, and in solving it we have elected to develop a *functional* type of organization rather than a *program* type. We have classified our personnel and determined our different administrative units on the basis of functions rather than on the basis of programs. Since the technique of tree planting is the same—whether the tree be planted for erosion control, flood control, or submarginal-land development—we let the same men administer the tree-planting work for all three programs. The same is true of agronomy, soils, wildlife management, engineering, farm management, and information and education. Thus the different programs are integrated—tied together in one program—and duplication of effort is reduced to a minimum. Then, too, the problem of coordinating the inner workings of the Service is much simpler in a functional type of organization than it would be in a program type.

Such an organization is flexible—readily adaptable to the varying needs of different areas—and it is capable of assuming an almost unlimited number of additional duties and responsibilities. If we were asked to administer a vastly expanded flood control program we would be forced to add personnel, of course; but the present form of our organization would remain the same. And that form is such that practically all of the funds assigned to us for the expanded program could be passed on to the field and used there in actual field operations.

That is another great advantage of our form of organization—the fact that expansion of our programs will inevitably mean a reduction in the percentage of total costs assigned to overhead. In this regard the functional type of organization differs greatly from the program type. If we were to proceed on a program basis, the relative costs of administration and operations within each program would be quite definitely fixed, and as additional work was assigned to us overhead costs would necessarily advance at the same rate as operations costs. As it is, absorption of a new program is likely to result in a revision of that program's

budget with a view to cutting administrative costs to a fraction of their former figure while increasing the funds available for work in the field.

Our organization might be compared to a pyramid, with the upper portion representing administrative overhead and the base representing the spread of actual field operations. In the beginning, the pyramid was tall and slender; it resembled the trylon of the New York World's Fair. Its walls, which were then flat surfaces, slanted only slightly as they reached from the ground to the pinnacle. But as the organization grew and additional programs assigned to us were broken down and distributed through functional units, the pyramid's base became broader and its walls more concave and gently sloping. Instead of a group of pyramids, each representing a separate program and each with a definite apex portion assigned to overhead, we now have *one* pyramid in which the apex or "overhead" portion has not expanded at anywhere near the same rate as the base of the pyramid.

As the Service grows, the relative size of the different parts varies, but the essential form remains unchanged. Our tendency is not toward more and more rigidly centralized control of all activities, but rather toward a *decentralization* of control.

The functional type of organization is carried down through the four levels of authority—from the Washington level, through the regional office level, to the area level, and thence to the work units in the field. At each of the first two levels, only as much authority has been retained as is absolutely necessary to assure proper coordination of activities, adherence to established policies, and general efficiency of performance. Every effort has been made to pass as much responsibility as possible on to the field units, so that local personnel will have the necessary freedom to deal promptly and effectively with local situations.

Establishment of the area office set-up was of special significance in this regard. Not only should this change cut overhead costs by reducing the number of administrative units, but it also should increase the amount of administrative authority in the field. As time goes on, and we all become increasingly aware of the broad purposes of our work and of the policies governing it, more and more freedom for self-determination is going to be exercised by field offices.

The Washington office functions in the determination of programs and policies; the regional offices function in the distribution, interpretation, and application of programs and policies, and determine Regional policies based on Service policies; the areas distribute and apply programs and policies; the work units execute programs in accordance with established policies. But in action, the flow of material through administrative lines is by no means one-way. In action, the administrative lines not only tie the organization together but also operate as a sort of circulatory system. Ideas and information gained from practical experience with the job on the ground flow up from work units through administrative channels to the upper levels of authority. There they are sifted and examined, and those found valid flow back down through administrative channels as policies, procedures, and approved programs.

Cooperation With Other Agencies

I am personally convinced that we have the most efficient type of organization for our kind of work. It points straight at that ideal of all organizations handling action programs: A minimum overhead and a maximum spread at the point of application. But no organization—no matter how streamlined—can be more efficient than its personnel. It is the quality of personnel that determines the quality of performance at every point.

But the Service alone cannot give farmers all the assistance they need to solve the land-use problems that confront America today. Cooperation with other agencies dealing with land-use problems is essential.

One of the chief responsibilities of the Service is the coordination of programs within itself and with relation to the programs of other agricultural agencies. Therefore, in our organization we have placed upon the State coordinators—under the administrative direction of the Regional Conservator—the job of fitting our functioning programs to the desires and needs of the States. The coordinators not only couple our work with the work of State agencies but also aid in actual program development and in the determination of policies and procedures within the Service itself.

The State coordinators are the "eyes and ears" of the Service. They are active contact or liaison men. Their offices are channels through which flows a major portion of the contacts between the Service and other agencies working in the States.

All along the line, provisions have been made for cooperation between the Service and other agencies, and in action the Service *does* work closely with many different institutions and groups. Take, for example, the submarginal-land purchase program now underway in 24 northern Wisconsin counties. The Service's land acquisition division has been buying land with funds appropriated under title III of the Bankhead-Jones Act.

But in determining what land to purchase, the Service has been working in the closest cooperation with State and county agencies and other Federal agencies. For instance, no land is being purchased outside the areas zoned against agricultural use by the counties. This is in accordance with Wisconsin's zoning law. County agricultural planning groups and the State college of agriculture aid in determining the priorities for purchase of the various tracts put up for sale. Every effort is made to coordinate the Service's purchase program with the rural rehabilitation program of the Farm Security Administration, so that farm families moving off submarginal land will have somewhere to go, with a new chance to "make good."

Further examples of cooperation between the Service and other State and Federal agencies are furnished by the flood-control surveys now underway in the watersheds designated by the Omnibus Flood Control Act. Here the Service joins with the Forest Service and the Bureau of Agricultural Economics, and in consultation with State agencies determines (1) whether circumstances warrant the establishment of a land-use program for flood-control purposes, and (2) if so, the general type of upstream program needed to do the job.

Important among the agencies with which we cooperate are the State colleges of agriculture, the State extension services, and the State experiment stations. State advisory committees, each composed of the administrators of these agencies, particularly the latter two, and the State coordinator have been responsible for formulating the State soil conservation program.

Cooperative extension agents are employed jointly by the Service and the State extension services to give leadership and supervision to the educational program in soil and water conservation in the State. Service technicians work in the closest cooperation with college subject-matter specialists, sharing with them information and practical experiences which may improve the programs of both institutions. And all informational and educational materials originating in the Service and used by it clear through college extension editors.

The Service also cooperates in fruitful ways with State conservation commissions, State departments of agriculture, and vocational agriculture teachers. In recent months there has been a considerable increase in active cooperation between the Service and local schools. Numerous training schools have been held to give vocational agriculture teachers and others working in the educational field detailed information concerning erosion-control practices. And for years now the Service has been making the most of its opportunity to give enrollees in C. C. C. camps assigned to us practical courses in the various phases of soil conservation.

The Service has an outward look. At every point in the field the Service seeks to cooperate in land-use programs promising immediate and long-term benefits to the farmer.

The Organization at Work

So far I have talked mostly about the inner workings of the organization and the manner in which it cooperates with other Federal and State agencies. I have tried to show how the work in the field has presented the pattern on which our organization has been molded. I have tried to show the reasons, in terms of flexibility and administrative efficiency, for the form our organization has taken. Now I should like to have you look with me at the Service from another standpoint—from the standpoint of the people and the land.

On the land we deal with is the farmer, Pete Olsen. Pete has a farm inside the boundaries of a certain demonstration project. He had been bucking the erosion problem for years, and he jumped at the chance to get help in solving his problem. He signed up, became a cooperator in the demonstration program. His farm was mapped. Service technicians and Pete worked together developing a farm plan that employed all the functions of the Service needed to do the soil-saving job. Engineers helped him build terraces and gully-control structures. Agronomists helped him work out cropping systems and soil-management plans. Foresters helped him get trees planted and a woodland management plan started. And, shortly, Pete found himself on top of his erosion problem for the first time.

Techniques, originating in the various functional units of the Service, flowed down along administrative channels through the various levels of authority and poured out, smoothly and efficiently, over every acre of Pete's farm. There they united in a complete, tangible farm program which Pete himself helped plan and apply.

That was 5 years ago. Today Pete's land-use problems are pretty well licked.

But some of Pete's neighbors are not so fortunate. There are quite a few farmers in his community who, for some reason or other, did not cooperate in the demonstration. Today, I believe they look with envious eyes on Pete's well-kept land and are acutely aware of the gullies crawling through their own sloping fields. Several of them are trying to copy Pete's program, but they are having their troubles and need some help in making complete farm conservation plans.

They are anxious, now, to "join up." They have numerous battles to fight against floods, against the poverty which rides down those who operate submarginal farms, and even against a rising water table that drowns crops and pastures in the low bottomlands. They need, and want, a coordinated attack on their various physical enemies for they realize that these destructive forces are closely allied.

So Pete Olsen and his neighbors are organizing a soil conservation district. They live—fortunately—in one of the 36 States that have passed conservation districts laws, and they are determined to take full advantage of the facilities that can be made available to them through district organization.

A few weeks ago, district supervisors were elected—Pete, incidentally, is chairman of the board—and a program and work plan have been drawn up. The county land-use planning committee and representatives of local State and Federal agencies assisted the district supervisors in this undertaking. The supervisors are now asking the Service to furnish technical assistance. The State college, the county agent, various State and local conservation organizations, as well as individual farmers, are cooperating with the district toward attaining a wise land use. Every day, more farmers are coming in to the district office, anxious to get some help in making their farm conservation plans. As a cooperative enterprise, the district is rapidly effecting soil conservation.

Now, the story of Pete and his neighbors points a moral—and a highly important one. In Pete's neighborhood, the job—considered from the standpoint of the land itself—is one of use adjustment. We are dealing there with land resources. Our job is to help these farmers plan for a reasonable living from these resources, using the income and conserving the capital.

But we, as a Service, and other agencies went ahead with the control program only after Pete and his neighbors showed us the green light—and they are still directing the traffic. This Service and the Extension Service brought to the people the facts about land abuse and the correction of it. We offered to them, insofar as we could, the Department's facilities. After that it was up to the people themselves. They have shaped an organization through which they can harness and employ for their own use technical energies which would otherwise be diverted into other channels.

The Soil Conservation District

The case of Pete and his neighbors is, I think, typical—and therefore significant. Out of the recent rapid expansion of Department activities, the conservation district is gradually emerging as the key to our field programs. We are working with an increasing number of people through organizations of their own. In the Soil Conservation Service, for example, we find more and more of our lines of action reaching down, fusing with activities and concepts coming up from the ground itself, and thus forming the programs and work plans of soil conservation districts. Or, to put it another way, we find groups of people with mutual land-use problems banding together, working out plans for the solution of their problems, and then reaching out toward the Service and other agencies for the help they require. It is a healthy development. Farm people are getting a more efficient distribution of the available technical and material aids, and at the same time tapping almost unlimited resources of energy, ideas, enthusiasms.

The Service—its programs broken down and coordinated on a functional basis—finds in the district a natural medium through which it can reach the people to assist them in planning and solving their land-use problems. The district's activities, it should be remembered, are by no means confined to soil and water conservation. Upstream flood control, submarginal-land purchase and development, the development of water facilities, drainage and irrigation, farm forestry—all of these programs can be effectively carried out through districts. So, perhaps, can the programs of other agencies—the Agricultural college, the F. S. A., the A. A. A., State Departments of Forestry and Conservation dealing with social and economic aspects of the land-use problem. The district, then, is turning out to be a very practical tool for bringing order out of chaos; it clarifies our thinking, gives more purposeful direction to action programs, provides a focal point on which all efforts converge.

But this concept is likely to have small meaning for us unless we couple with it the concept of the "problem area"—and in clarifying this latter concept for myself I like to direct my thinking toward actual situations which I have encountered in the field.

I find myself unconsciously picturing in my mind the country which lies along the Mississippi in southwestern Wisconsin, southeastern Minnesota, northeastern Iowa, and northwestern Illinois. Ages ago, when the great glacier spread down over mid-America, this area was for some reason left untouched. While masses of moving ice scooped out lake beds and ground down hills in the surrounding areas, this one spot stood out—stark and bare—as an island in a frozen sea. Consequently the hills today are higher

and steeper here than they are in surrounding areas and the soil—a windblown loess deposited after the retreat of the ice—is more susceptible to erosion damage than most soils. All through the area we find sharply defined small watersheds with relatively narrow ridges and valleys—both of which are customarily farmed—separated by steep, timbered valley walls.

And in the watersheds the scars of land mis-use are clearly evident. Scattered through most of them are numerous spots where sloping ridgeland fields are gashed with gullies and rich bottomlands are buried under erosion debris. In these watersheds we find, in intensified form, the problems of accelerated erosion and increasing floods. We find, too, a gradual but unmistakable decline in land capabilities and an increase in the number of farms which are no longer profitable economic units. Fortunately, desolation is not so far advanced that the area cannot be saved for future agricultural use. But throughout the 17,000,000 acres the problems of erosion control, land-use adjustment, and flood control are acute—while submarginal-land retirement and development are emergent problems.

Here, then, is a sample problem area. For the most part the farms within it have a common soil type, a common topography, and a comman land-use pattern (dairying and livestock production are the principal farm enterprises). In other words, the farmers in the area have a common physical environment and they are, most of them, trying to manipulate that environment in about the same way. Hence, a land-use program that is good for one farm in the area is likely to be good—so far as essential features are concerned—for all other farms. The farmers have a physical and economic basis for broad-gage planning. In the circumstances, what is more natural than that farmers should link themselves together with a view to attaining objectives that could not be attained through isolated individual efforts?

The districts are for mutual assistance, and I am happy to say that quite a number of them are being organized—most of them along watershed lines—in the area I have cited. Eight hundred and forty-two thousand acres are included in the actually established districts, and it looks as though the entire unglaciated area soon will be covered by them.

The district has barely begun to do the job it is designed to do. But four out of the five States in Region 5 now have the necessary enabling legislation.

Most of the field programs in this region are still being carried on through erosion-control C. C. C. camps, drainage C. C. C. camps, erosion-control demonstration project areas, and submarginal land projects. But the district, as I say, is the coming thing and well worth stressing for that reason. It seems inevitable that eventually all our work units will be included in or identified with these organizations of the people on the land.

The district, then, is the doorway through which we enter the future. It is one of the doorways through which the transition is being made from the exploitive, competitive agriculture of the past to the cooperative, conserving agriculture of the future. And the thing I like best about the doorway is its architecture, which is unmistakably American. Designed in accordance with American traditions and practices, democratic in conception, the district stands firmly grounded in the good American earth.

FOLLOW THE CONTOUR AND IMPROVE THE MEADOWS

By R. W. GERDEL [1]

ANY FARMER would gladly perform simple conservation practices if he knew that he could reduce soil losses in his cornfield from 98 tons to less than 4 tons per acre per year.

Such remarkable reduction in deposited soil losses actually was accomplished on strip-cropped fields in the Salt Creek demonstration area, Zanesville, Ohio, within three growing seasons. Reduction in soil losses seems largely the result of two conditions, (1) improvement in contour adherence of the cultivated strip and (2) better meadows resulting from a correct fertility program.

The figures showing that soil losses were reduced to this extent are taken from strip-cropping investigations made during the years 1936, 1937, and 1938.[2] Evident erosion in corn strips was determined by measurement of the volume of soil in the colluvial fans deposited in

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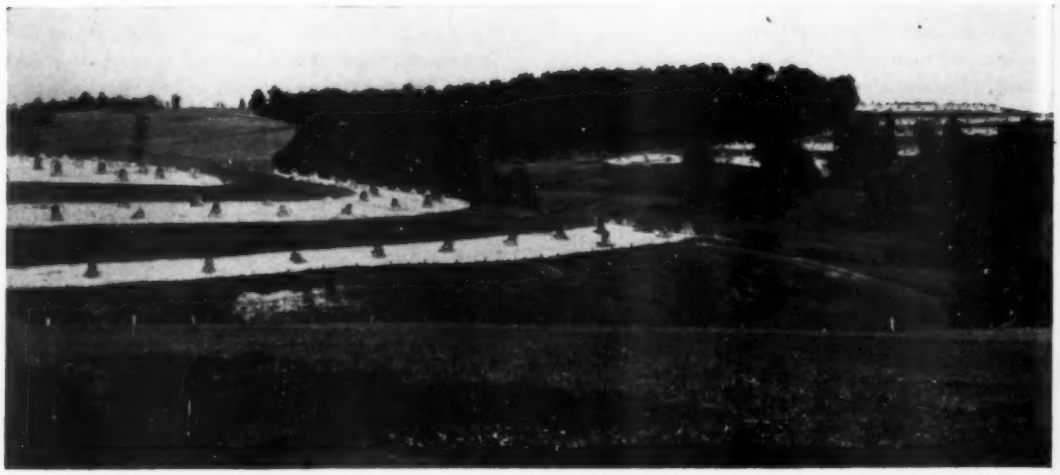
[2] The Divisions of Operations and Research of the Soil Conservation Service and the Ohio Agricultural Experiment Station cooperating.



The contour strip-cropped fields on one of the farms where deposited soil losses were measured.

meadow strips below the corn. Measurements were made on two adjacent farms whose owners are Soil Conservation Service cooperators. Soil losses measured in 1936 and 1938 were in the same fields although in different strips of the 4-year crop rotation system in use. The measurements in 1937 were made in different fields on the same farms, because of the two-unit strip-cropping system in effect.

The photograph shows strip-cropped fields on the Floyd Lapp farm, one of the two where measurements were made. Average deposited soil losses for each year as shown in table 1 were influenced by such variables as contour adherence, steepness of slope and length of slope. Since different fields were involved in the measurements for 1937 and 1938, the significance of the difference between the deposited soil losses for these 2 years was tested by Fisher's [3] method on selected strips, homogeneous for length and steepness of slope and contour adherence, from each field. The difference was found to be highly significant.

A comparison of the deposited soil losses for the 3 years indicated a remarkable improvement in the erosion control effectiveness of strip cropping as the full conservation program developed on these farms. The reduction in evident erosion on these strips, from 98.3 tons of soil per acre in 1936 to 34.8 tons of soil in 1937, with still further reduction to a loss of only 3.7 tons per acre in 1938, not only reflects the improvement in contour adherence, but also indicates the improvement in the meadows resulting from a good fertility program.

[3] Fisher, R. A.: Statistical Methods for Research Workers, 5th edition. Edinburgh, 1934.

Improvement in contour adherence of the strips was achieved by increasing the width of the numerous sod waterways which bisected these strip-cropped fields. Carrying the sod up over the shoulder of the drainageway greatly reduced the amount of divergence from the contour which had previously resulted from planting corn down the sides of the draw to the sodway left in the bottom of the depression.

Observations indicated that in addition to the improvement in contour adherence, a large portion of the reduction in evident erosion, from 98 tons of soil per acre in 1936 to approximately 4 tons in 1938, could be attributed to the improvement in the organic-matter content and fertility level of the soil. The strips planted in corn in 1936 were plowed out of a poor poverty-grass sod. The use of lime, fertilizer, and a good grass-and-legume seed mixture, with small grain as a nurse crop, resulted in rapid improvement of the meadows. By the spring of 1938, an excellent quality of vegetation was plowed down for the corn crop.

Although the project was not equipped to determine the organic content or fertility level, all observations indicated a considerable increase in the humus and nutrient content of the soil in these strip-cropped fields by 1938.

This remarkable improvement in the effectiveness of strip cropping is emphasized when the results of these studies are compared with data from the Northwest Appalachian Soil and Water Conservation Experiment Station near Zanesville. At this station, a greater soil loss was obtained in 1938 than in 1936 or 1937 from corn grown in rotation as shown in table 1.

TABLE 1.—*Deposited soil losses from corn strips on 2 adjacent farms of cooperators in the Salt Creek project area and soil losses from rotation corn plots at the Northwest Appalachian Soil and Water Conservation Experiment Station, Zanesville, Ohio*

Year	Lapp and Gosser farms			Experiment station	
	Percentage of contour divergence	Rainfall [1]	Soil loss	Rainfall [1]	Soil loss
	Percent	*Inches*	*Tons per acre*	*Inches*	*Tons per acre*
1936	6.5	18.61	98.3	17.09	54.3
1937	4.2	23.28	34.8	19.40	41.9
1938	3.5	21.65	3.7	22.24	72.6

[1] Total rainfall for growing season, May to September, inclusive.

NOTE.—For 6 strips from the 1937, and 6 from the 1938 data homogeneous for watershed, slope, and contour adherence, $D=20.7\pm5.8$, $t=3.56$. Degrees of freedom=10. The difference is highly significant.

TABLE 2.—*Precipitation during the growing season at the Northwest Appalachian Soil and Water Conservation Experiment Station, Zanesville, Ohio, and the E. H. Gosser farm, Salt Creek project*

Year	Location	May	June	July	August	September	Total
		Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1936	Experiment Station	1.98	1.37	6.09	4.89	2.76	17.09
	Gosser farm	3.09	1.70	9.19	4.76	3.87	18.61
1937	Experiment station	4.35	6.85	2.84	3.63	1.53	19.40
	Gosser farm	4.35	7.83	5.78	3.66	1.66	23.28
1938	Experiment station	6.61	4.72	2.43	3.85	4.63	22.24
	Gosser farm	6.43	4.64	3.20	3.43	3.95	21.65

Comparison of the seasonal rainfall at the experiment station and at one of these two farms where a rain gage is located (see table 2) does not indicate sufficient differences in precipitation to influence the results.

It appears that the achievement of a satisfactory contour adherence and the development of high quality meadow strips through the use of lime, fertilizer, and good seed mixtures will materially improve the erosion control value of strip cropping. Although such remarkable improvement may not always be obtained, the results in this instance indicate that reasonable improvement in erosion control may be expected under most conditions as the farmer's complete farm-planning program approaches full development.

THE FARMERS ARE HEARD FROM

By BUSHROD W. ALLIN [1]

THE VOICE of the farmer is being heard in the land, through county planning committees, for the first time since the Secretary last October directed reorganization of the Department of Agriculture.

One of the primary aims of that reorganization was to provide a channel whereby farmer opinion could influence national agricultural programs and whereby technical opinion could be made available to farmers in wrestling with their local problems.

In the months since the Secretary's order was issued, the land grant colleges and the Bureau of Agricultural Economics have been working energetically toward making a reality of the aims outlined in that order.

And now the first fruits of this work are becoming apparent. Farmer-drawn recommendations are beginning to arrive in Washington. Two of these sets of proposals are from Hill County, Tex., and Sonoma County, Calif., both classed as "intensive" counties, in the terminology of the county planning project. Such counties are those in which the planning is preliminary to that being done in the counties known as "unified program" counties.

"Intensive" counties are counties in which the farmers have gone a long way toward outlining a plan whereby they believe the national farm programs in their counties can be advantageously altered, counties where farmers are already tackling some of the other problems that do not call for changes in Federal action programs. So much for the "intensive" counties. On the other hand, "unified" counties are those counties where it is expected it will be possible for the action agencies to reflect this farmer opinion in their programs for 1940, and where a major effort at reconciling local, State, and Federal programs will be made next year.

The recommendations from these two county committees—one in California and one in Texas—are interesting for many reasons, aside from their being among the first to reach us in Washington. The broad scope of problems and solutions with which they deal, and the frankness with which they go into their own situation and the possibilities for change, cannot but be regarded as hopeful signs for the future.

Suppose we look at some of the specific recommendations of these committees, taking Sonoma County, Calif., first.

The Sonoma County committee felt that a detailed soil survey of the county should be undertaken by the Department of Agriculture and the Soils Division of the University of California. It also urged that an investigation of the suitability of new crops that might be produced in various sections of the county would be desirable, recommending that a committee of five

[1] Head, Division of State and Local Planning, Bureau of Agricultural Economics, Washington, D. C.

165081—39——2

members be appointed by the farm advisor to look into the possibility of introducing such newcomers as ladino clover, grain and fodder crops, and to work out desirable field crop rotations for various sections of the county.

The extensive demand in the local markets for cereals, particularly wheat, barley, and oats, led to the suggestion that more of these grains could be profitably grown in the county. To accomplish this, it recommended: (1) that an adequate supply of black oat seed be developed; (2) that the rust-proof red oat seed supply be improved by the introduction of a rust-proof resistant strain; (3) that the local bluestem wheat seed supply be improved by the introduction of a smut resistant strain; (4) that limited early fall planting trials of "Vaughan" variety of barley be made.

Noting that in some parts of the county the water supply is inadequate, the committee recommended water development by the Soil Conservation Service, the Bureau of Agricultural Economics, and the Farm Security Administration under the Water Facilities Act.

Eroded areas on steeply rolling hay and grain lands, it was believed, could be substantially protected from further washing by diversion from hay and grains to suitable grasses. The committee suggested that range reseeding trials be conducted, including reseeding of a trial plot of range by airplane, this work to be undertaken cooperatively by range operators, the State Forest Service, the Agricultural Extension Service, the agronomy division of the University of California and the Department of Agriculture.

It asked, too, that the County Agricultural Extension Service and the Soil Conservation Service continue work now under way on range grass nursery plots, and that as soon as possible more such experimental plots be started by them. To further deferred grazing on the range land of the county, it advocated continuation of A. A. A. payments for such deferred grazing.

Turning to forestry aspects of its report, to preserve and possibly increase the range areas of the county, it suggested the need for continued experimentation by the State division of forestry and the Forest Service, or by the latter alone, to determine under what conditions controlled burning of mountainous brush areas is desirable.

The committee recommended the preservation of the remaining virgin stands of redwood lumber in the county, and to that end the acquisition by the Government at a reasonable cost of a designated area as a part of the proposed Mendocino Coast Recreational Forest. The importance of Sonoma County's timber and brush-covered areas as recreational regions and "watershed supplies" for the increasing population, the committee felt, renders fire control of vital significance.

It therefore recommended the extended use of C. C. C. workmen in building roads through these areas and for fire suppression. It thought that the development of livestock should be encouraged in order to promote better use of land, suggesting appointment of a livestock committee charged with formulating proposals for better marketing facilities within the county.

As to water problems, the committee noted that preliminary examinations of the flood control situation in the Russian River Basin have been completed by the Secretary of War and the Secretary of Agriculture, and strongly recommended that these agencies give favorable consideration to the Russian River Basin flood control project. Further orderly development of means of irrigation is desirable throughout the county, the committee also believed, recommending (1) that the Agricultural Extension Service continue its survey on underground water supplies of the county in order to determine what changes are taking place in the water levels from year to year; and (2) that further information be obtained and made available as to financial, engineering, and other assistance available to persons and groups under the Water Facilities Act.

No less specific were the recommendations that emerged in the preliminary report from Hill County, Tex. Although the county was divided into seven areas by the committee, one area covers more than 54 percent of the total county area. The committee listed these as the important agricultural requirements of this area: (1) Expansion of the farm water supply, since about 50 percent of the farms do not have sufficient water; (2) control of erosion in that region of high rainfall, and sloping land, where a crumbly calcareous soil planted largely to cotton and corn make erosion a grave problem; (3) root rot control, since an estimated 25 percent of the cropland in the area already is infested with cotton root rot; (4) production of a sufficient quantity of food and feed for home use, inasmuch as too large a percentage of the land is planted in cotton while the acreage in pasture, feed, crops, gardens, and orchards is too small; (5) pasture improvement.

Outlining its recommended cropping system and livestock organization, the committee set the size of the recommended farm at 150 acres, as opposed to the

1937 average of 136 acres. It placed less emphasis on cotton in the recommended farm, although it thought the acres in cotton per farm should be about the same. Specifically, it asked a decrease in cotton for the area as a whole of 13 percent, which with some additional acreage now in idle cropland and miscellaneous crops, would allow for recommended increases in feed crops and Sudan pasture, home gardens and orchards and permanent pasture and farmstead. Under its recommendations, workstock and beef cows would be eliminated, although other classes of livestock in the area would be increased.

The committee listed these recommended conservation practices for the area:

1. All the cropland (with the exception of small overflow bottoms) needs terracing, for only about 15 percent of the land in cultivation is properly terraced;

2. Cotton and feed should be planted in alternate strips on the contour, a practice designed to reduce damage from cotton fleahopper as well as to minimize erosion.

3. Corn should be interplanted with peas or Hubam, either through alternation of two rows of corn and two rows of peas, or four rows of corn and four of peas. After corn is harvested, the entire acreage should be turned under while peas are green;

4. Fields, excepting corn, should be grazed after harvest;

5. Small natural drainageways, especially those that are eroding, call for: (*a*) Terracing if badly eroded, and otherwise solid contour listing; (*b*) establishment of improved varieties of pasture plants such as dallis grass, buffalo grass, and burr clover; (*c*) fencing the pasture for livestock, and if it is not adjacent to the farmstead, a connecting lane. A trench silo was recommended on farms where there is a well-drained spot and where the soil is not likely to become too moist or the sides to slide during rainy seasons.

Other areas in Hill County called forth such additional recommendations as that for provision of loans at low interest rates "without red tape;" improved housing facilities, roads and schools; lease agreements to give more security to the tenant; disposal of crop residue; insect control.

These counties—Hill County, Tex., and Sonoma County, Calif.—are demonstrating the new way of democratic participation in planning, whether local, State, or national. Their recommendations are explicit expressions of the farmer's point of view, and are interesting to people concerned with county planning as a hint of what a broad program of planning can mean.

COUNTY GROUP PLANNING

COMMUNITY EDUCATION for soil conservation as the logical approach in starting a new project has been proved on the Grand Traverse, Mich., project.

In 1938 the county land-use planning committee met to discuss the need for a soil conservation program in this cherry-producing section. Then in January 1939 a series of educational meetings was held to describe soil conservation work on other projects and districts in Michigan. At these meetings there was no public intimation that a project might be established.

Later the land-use planning committee, consisting of 15 members, met with the county agent, State coordinator, and extension soil conservationist to discuss the functions of a soil-conservation project. The committee voted unanimously for the establishment of a project. They limited demonstrations to 50 or 60 farms in the area and agreed that only technical services would be required in the development of the project.

APPROVAL for the establishment of the demonstration area was obtained from the Secretary of Agriculture in April. An executive advisory committee was selected, to arrange agreements with all cooperators in the area who were anxious to have their farms planned for soil conservation. The committee also made the arrangements for project headquarters. The farmers in the area participated in the planning. A trip was arranged to the nearest Soil Conservation Service project, some 200 miles distant, at Benton Harbor where conditions were similar to those of the Grand Traverse area.

"Project technicians were made available to plan the farms, but the local committee continued to function," E. C. Sackrider, State coordinator for the Service in Michigan, stated. "Farmer participation in the development of programs is the logical approach to obtain desired cooperation. A number of requests have been received from the adjoining county for a series of educational meetings to discuss soil conservation and to explain the Soil Conservation Districts Law."

CHOOSE SUPERIOR LOCUST STANDS FOR SEED COLLECTION

By JOHN W. SITES [1]

PROBABLY at no other time in the history of the United States has any single species of tree been so widely planted or generally acclaimed for use in land reclamation as has black locust (*Robinia pseudoacacia*) during the past few years. Millions of these trees have been planted in the Ohio Valley region alone, and the total for the Nation approaches a billion. During this short time thousands of pounds of seed have been collected and planted in nurseries for the production of seedling stock. Seed and seedlings have been shipped to all parts of the United States *with too little thought having been given to their origin.*

Nurserymen and foresters alike have spent considerable time perfecting methods for the various operations and to improve techniques. When one looks into it, however, and sees what little attention has been given to the matter of seed collecting from preferable sources, all this seems decidedly inconsistent. Probably no other single operation well done would contribute so much toward successful plantations as careful consideration of parent stock. At a conference of Pennsylvania foresters, George S. Perry, research forester for Pennsylvania, expressed a thought well worth repeating: "Forests of the future can be at best but little better than their heredity."

It is for the most part recognized, although vaguely understood, that in collecting seed for use as propagating material, reasonable care should be given to the selection of the parent trees. But in far too many instances this is easily forgotten, especially in the collection of locust seed when large quantities must be gathered quickly.

Locust trees in general seem to exhibit a tendency toward considerable variations in habit of growth. In many instances the reason for this variation seems to be genetical, and not too closely associated with environmental influences. There are few communities which do not have at least one outstanding grove of locust trees. The straightness of the trunk, the absence of conspicuous side branches and forks close to the ground, rapidity of growth, and general thrifty condition of the trees are characteristics which are easily recognized; and, as a rule, such a grove presents quite a contrast to the average locust in a particular community. A closer examination of the soil and other conditions will help to determine whether or not the cause is entirely environmental or whether these trees are genetically different from others in the community. Often the owner knows the history of the trees, and enlightening information can be obtained from him. It is not a difficult task for any technician to make note of stands which look promising and later to advise those concerned with observational studies so that they may make more detailed investigations. By such simple means superior stands of locust trees can be charted for subsequent use as sources of seed. Particularly desirable stands should be reported to the regional nurseryman so that, if warranted, vegetative propagation can be employed.

It is not to be presumed that simply by the mass selection and collection of seed from superior type stands will all of the progeny resulting therefrom exhibit these identical characteristics. It is reasonable to assume, however, that, by and large, these young stands will in a few years develop characteristics superior to the average trees in the community.

Newly reclaimed areas are most satisfactorily established by planting seedling stock, and from these plantings natural regeneration will continue. J. A. Larsen [2] has demonstrated the fact that natural regeneration of locust occurs in most cases by means of root suckers. This, of course, means that these plants have characteristics identical with those from which they originated. Surely, from the standpoint of heredity, this emphasizes the desirability of planting only the best stock obtainable. We cannot be excused for perpetuating inferior type locust trees; and certainly, only good can result from a correctly executed seed-collection and planting program.

Within the Ohio Valley region several exceptional stands of black locust have been observed. It has been the policy, thus far, to select from these groves one particular tree which seems superior to the others and to propagate vegetatively by means of root or stem cuttings, from this individual, small numbers of plants for further study. By such means all progeny is traceable to one parent plant.

In addition, all seed possible is collected from these stands, is assigned an accession number, and used for

[1] Assistant regional nurseryman, Soil Conservation Service, Dayton, Ohio.

[2] Larsen, J. A.: Natural Spreading of Planted Black Locust in Southeastern Ohio. Journal of Forestry, June 1935.

(Continued on p. 43)

Tree Types as a Guide for Seed Collection

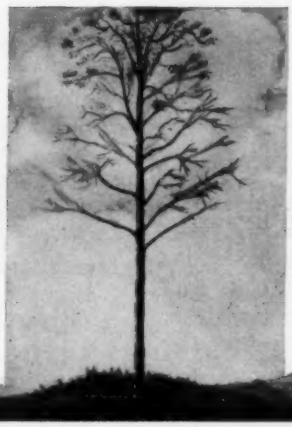
Second growth from root suckers after clearing, 45 years ago.

This superior *Type Stand* at "Locust Grove Church," New Lisbon, Indiana, clearly illustrates reproduction by root suckers. Note the resemblance of young trees to parent *Type*.

Remnant of original planting made 80 years ago.

These trees growing along Route U. S. 23 South of Alma, Ohio, are typical of desirable types.

Such undesirable characteristics should not be perpetuated



This grove located close to Howell, Michigan, is from 25 to 40 years old. Trees from this stand have an excellent reputation for straight splitting.

RANGE MANAGEMENT BRINGS SUCCESS TO ISLETA INDIANS

By DEWEY DISMUKE [1]

Diego Abeyta, Pablo Abeyta, and Esquipula Jojola, three Isleta Indians designated by the Commissioner of Indian Affairs as trustees of the community cattle herd. They have held office since their appointment in 1936, and have cooperated with the Soil Conservation Service in the management of cattle and range.

CALVES from the 212,000-acre range of the Isleta Indian Pueblo weighed an average of 255 pounds at shipping time in 1935. In 1938 the average weight was 378 pounds, an increase of 123 pounds.

Prior to 1934, the range was leased to non-Indian livestock interests. The Indians' annual income from it was $2,500 to $3,000. Under the present program the community herd is in position to return to the Indians an annual income of $7,000 to $9,000—triple the previous income.

Isleta Indian Pueblo lands are located 14 miles south of Albuquerque in central New Mexico. When these Indians leased the major portion of their range to non-Indian livestock interests, some 10,000 head of sheep and 1,000 head of cattle in the non-Indian herds usually grazed the area year long. In addition, 500 head of individually owned Indian cattle grazed there. This made a total of about 3,500 cattle units making use of these lands.

Due to the absence of adequate interior fences and range watering places, the distribution of the livestock was none too good. A range survey by the Soil Conservation Service, in the summer of 1935, revealed an estimated carrying capacity of 1,750 cattle units year long. Obviously, because of overstocking and poor distribution, the range was being utilized detrimentally. Land deterioration was apparent.

[1] Associate soil conservationist, Soil Conservation Service, Albuquerque, N. Mex.

The Isletas are not primarily livestock-minded, having become interested more in farming than livestock. The Office of Indian Affairs advanced the idea, early in 1934, of canceling leases to non-Indian grazers and, in lieu, encouraging the Indians to run livestock of their own.

In the fall of 1934 the leases were canceled and the non-Indian stock removed. Some 1,500 head of white-faced Hereford cattle, ranging from yearlings to old cows, and 85 white-faced Hereford registered bulls were obtained from the Federal emergency drought relief program for issuance to these Indians.

Early in 1936, this herd was culled to conform with the estimated carrying capacity established by the Soil Conservation Service survey. There remained 864 head of the best cows and 65 head of bulls, which were turned over to the Isletas and designated as the Isleta community herd.

An indenture was written by the Commissioner of Indian Affairs, providing for the management and payment of the herd by three Isleta trustees. One heifer yearling for each animal issued was to be paid to the Government by March of 1939. Enough steers were allowed to be disposed of annually through sales channels to provide funds for paying herders, and buying vaccines, salt and mineral supplement and other items incident to the management of the herd.

In accordance with the range management plan formulated as a result of the range survey, the range was subdivided into pastures by the use of interior fences. Corrals, and additional range watering places adequate for proper management, were added. One pasture of sufficient size was set aside for the individually owned Indian cattle, in which the majority are grazed. This class has remained fairly constant in number since 1934.

In January 1936, the administration of the range and cattle—the community herd and its allotted range in particular—was placed under the direction of a Soil Conservation Service range rider. The management from that time on has been exercised by the range rider collaborating with the trustees. Matters pertaining to the individually owned cattle also are handled by this group.

When issued, the community cattle consisted of a fair grade of the breed, while the individually owned

Representative Isleta-owned cattle. Range is in fair condition in immediate vicinity of water. Proper distribution and seasonal use have made it possible to show a remarkable recovery of the range in the neighborhood of permanent watering places.

cattle were of a rather poor quality, but of the white-faced Hereford strain. The latter cattle, prior to 1936, were sired mostly by grade bulls. A move was started, early in that year, to eliminate grade bulls and make available registered bulls from the community-owned bull herd.

The cattle industry among the Isletas has been very successful for the past 3 years. The entire community-owned herd presents a very outstanding picture. All of the females have been dehorned. There is a noticeable uniformity in color and body conformity. All are well located and acclimated. A noticeable improvement is seen in the quality of offspring in both groups of cattle as a result of mating with registered bulls.

Last November the trustees returned to the Government the final installment due on the community-owned cattle. The tally on March 1 of this year was 598 cows, 76 two-year-old heifers, 98 one-year-old heifers, 6 yearling steers, and 62 bulls—a total of 840 head. The maintenance fund had $10,322 in its account on this same date. At present-day market value, the cattle are worth approximately $41,000. This amount, plus the account in the bank, represents what has accrued to the Isletas as a result of the cattle program inaugurated in 1934. Lease accruals realized by these Indians from non-Indian livestock interests, prior to acquisition of the community cattle, amounted, annually, to $2,500 to $3,000.

A definite improvement is noted in the range vegetation since 1936. This is reflected in the weight of the calves at shipping time: 1935 calves weighed 255 pounds; 1936 calves, 265 pounds; 1937 calves, 335 pounds; 1938 calves, 378 pounds.

The success of the program is credited to the fact that the range has been stocked during the past 3 years at its estimated carrying capacity and the livestock have been managed properly. Close cooperation has prevailed between the trustees and the range rider. At no time has there been any difficulty in securing approval to the Soil Conservation Service plan of management. This task has been made easier by having to deal with only three individuals. Naturally in revolutionizing methods in range and livestock management, with a large group of individuals more difficulty is experienced in securing unanimity of opinion and action.

It would seem, therefore, that the Isletas have realized a very worth-while industry in having acquired livestock of their own in preference to leasing their range to others. The range resources are definitely better than in 1935 and a consistent improvement is taking place. The community cattle are now returning from $7,000 to $9,000 annually, compared to $2,500 to $3,000 from leases to non-Indians.

INCOME FROM PELTS

In Granite Canyon, Wyo., one rancher chalked up an income of $1,000 in 1937 from coyote, wildcat, skunk, weasel, muskrat, fox, and raccoon pelts taken from 3,759 acres and immediately adjacent territory.

ANOTHER LOOK AT THE CONTOUR BALK METHOD

By B. H. HENDRICKSON [1]

THE CONTOUR balk method as used in the Southeast refers to the practice of permitting certain winter legume cover crops, and sometimes winter grass-legume combinations, to go to seed in narrow strips or balks about a foot wide, between rows of summer crops. In order to provide space for cultivation, the minimum practical spacing for the rows of summer crops is about 4 feet.

Reseeding annual legumes are used, mainly crimson and southern spotted-leaf bur clovers. In the Piedmont, ryegrass seems to work well in combination, particularly with crimson clover. Hop and white clover, and the vetches, have been used also.

One of the basic ideas in connection with the use of the balk method has been to obtain volunteer stands of desirable winter cover crops, year after year, and during the summers to grow common row crops on the same land. Cotton, corn, cowpeas, soybeans, velvet beans, grain sorghums and a few other crops have been grown using this method. Another very valuable feature of the method is the protection against erosion afforded to sloping croplands. This protection is effectively provided by the dense-growing balk vegetation during the spring months when croplands ordinarily are freshly plowed and susceptible to serious washing. Another feature is the repeated green manuring and mulching.

The method has been used by a few southeastern farmers for a number of years, but has not found wide acceptance. It appears that there are several reasons why acceptance has not been more widespread: (1) On sloping croplands badly needing improvement and protection, it is difficult for most farmers to establish satisfactory stands of winter cover crops; (2) farmers fear that during wet springs, the balk vegetation will spread and smother out the young row crops or interfere with cultivation so that the cropland may become excessively weedy or grassy; and that during dry periods the competition for plant food and moisture will cause young stands of summer row crops to be set back, or to "burn up," and fail. Another point to be considered is that in some sections of the country, increased damage by insects may interfere seriously with the practice of growing certain combinations of crops in narrow alternate strips.

There is a chance that early spring rainfall may be inadequate, at times, to supply sufficient soil moisture for both the growing balk vegetation and the germination and seedling growth of summer row crops. Normally, the moisture needs of crops in seedling stages are so small that the localized use of soil moisture in isolated balk strips has not affected the early growth of row crops. In some years, reduced run-off should tend to offset this use of soil moisture. Of course, the alert farmer may plow out his balks at any time in the course of row-crop cultivation, if droughty weather demands that clean culture and dust-mulch surface soil conditions are more essential than standing balk protection and maturity of balk vegetation.

It is true that croplands planted to cover crops are not at first as easily turned as are fallow topsoils to which most Southern farmers are accustomed. In this connection, there is need for improvement in the design of plows and cultivators, particularly of single mule-drawn shovels, wings and sweeps ordinarily used as single-stock equipment.

Field tests of the method on the Southern Piedmont Experiment Station, in 1938 and 1939, have shown that winter cover crops of desired type for balk use can be grown on good to fair land, if proper preparation, some fertilization, and good inoculation and planting methods are used. Ryegrass has a rather wide adaptability and can be grown with crimson clover on the better land and with vetch on the poorer land. No tendency for weediness has been noted. In fact, the balk vegetation tends to smother spring weeds in balks which would otherwise need to be hoed out. Vetch is the only crop used which tends to spread. The third objection, namely, moisture competition between row crops and balk vegetation, is valid and serious, and appears to be the limiting factor in the use of the method. In two years of tests to date, however, no perceptible setback of young summer row crops has been noted, by comparison with growth in check areas which are clean tilled, up to the time that crimson clover matures its seed in late May. At that stage, early planted cotton is about 6 to 8 inches high. In fact, the young summer crops seem to do a little better in the interbalk rows than in check areas, during their early stages of growth.

Attempts are being made, in station tests, to determine whether or not it is possible to retain dense-growing balk protection for longer periods during the

[1] Project supervisor, Southern Piedmont Experiment Station, Athens, Ga.

growing season, without detriment to row-crop yields. Present indications are that this is inadvisable, unless some special layout is used. This is because June is a month of rapid vegetative growth for the principal row crops, and summer temperatures are likely to prevail so that evaporation and transpiration are likewise rapid. Clean cultivation is then highly important, in order to conserve all available moisture for use of crops.

Ryegrass is thought to be a desirable component in the balk vegetation mixture. It ripens its seed near the same time as does crimson clover and the two seeds can be combine-harvested together on seed patches. Ryegrass continues to grow, however, through June and does not die down until about the first of July. In balks it appears that this late ryegrass competition for soil moisture may be especially detrimental to row crops growing alongside, mostly so to corn and least so to cotton. In other words, ripening ryegrass does smother out weeds and delay the growth of crabgrass, but the conditions in June are such that clean culture is generally advisable; hence, the balks, it seems, should be plowed out about the first of June. Use of an earlier maturing grass would be preferable.

The resultant strips of mulch can be expected to be beneficial in various ways until the moisture and heat of summer bring about its decomposition. There was some indication, in 1938 tests, that crop response to the nitrogen cycle that accompanies this method may be favorable. Ordinarily, complete turning under of winter legume crops, in the spring, results in a peak production of nitrate nitrogen before summer crops can utilize it.

Station experience has been that early land preparation for summer row crops is desirable. Beds 4 feet apart leaving balks one foot wide may be prepared in February or March, for cotton. At that stage, only a small amount of green manure will have been turned under, but well-settled beds result, in which good germination can be expected. Box bedding for corn and sorghum appears best, with a team-drawn ripper to loosen the subsoil properly before the land is listed again to form a low bed. Beds may be cut down and settled with a team-drawn cutaway or disk harrow. Spring preparation by this method is faster than usual plow methods and more land can be handled, in early spring, with the same time and effort. In effect, part of the turning is done preceding the planting of summer crops, and part of it is delayed until about the third cotton cultivation, about June 1, when it serves both purposes.

From the standpoint of the soil conservationist, there are many points of interest in this balk method. For example, it seems to remove the risk attached to the growing of winter cover crops just ahead of cotton. When complete turning under is delayed in the spring in order to permit considerable top growth of green-manuring crops, there is danger that the necessarily early cotton planting date may be delayed and that poor stands may result. Another feature is that the same winter cover crops may be repeatedly grown as volunteering crops, for some years, on the same land with the likelihood that succeeding stands and growths will improve, as they generally do, as inoculation becomes better established. This applies to volunteering clovers which do not become diseased; it may not apply to the vetches. Still another feature is the flexibility of the cropping system, which is unique in that protective and soil-improving aspects remain, although summer crops may be changed.

In the event that original cover crop stands are thin, or that volunteering does not succeed in some years, it is a simple matter for a farmer to maintain his seed patch and gather his own unhulled seed for reseeding purposes in the fall, on land already well inoculated.

The southeastern farmers need to use better protective and soil-improving practices for their erosion-damaged lands. Any practical cropping plan, including protective and soil-improving features, which has elements of both permanence and flexibility, is desirable. It is true that the same winter cover crops used in the balk method can be entirely plowed under for green manure as part of land preparation for summer-grown feed crops, and the fields can be resown to the same or other winter cover crops in the following fall in order to obtain the better stands and growths that ordinarily recur after repeated plantings on well-inoculated, well-phosphated cropland. The balk method, however, achieves the same end more economically and at the same time apparently does not limit the summer crops to late planted or catch-crop types.

Summarizing, the balk method provides for yearly volunteer stands of winter cover crops; it permits temporary field grazing in early spring; it provides green manure plowed under early, each year, together with contour strips of mulch to produce more slowly decomposable organic matter; and it makes possible the production of a choice of summer row crops each year. From the point of view of protection, it appears that the best available winter cover is supplied, with

(Continued on p. 40)

IT WAS UTAH'S "DUST BOWL"

By FRANK J. HALE [1]

A FEW WEEKS ago I talked with Wallace Sagers, the first cowboy and sheepherder in the Tooele Valley, 20 miles west of Salt Lake City, whose keen memory enabled him to go back to the early days as vividly as though it were but a year ago.

Seventy years ago, when Mr. Sagers was 10 years old, it was his job to look after the cattle and sheep in the Tooele Valley. All stock were put into a cooperative herd. His first band consisted of 10,000 sheep and 7,000 cattle.

"It was not much of a job in those days looking after just that many," Sagers told me. "About all I had to do was see that they did not feed too high up in the mountains. That was not hard, as wild flowers and sweet grasses were above the sheep's backs and up to the cows' bellies. Naturally, stock moved about at different seasons, taking the lower country towards the lake shore in the winter and reaching the higher land in the summer, but not into the forest."

"But why," I asked, "did you not want them to get into the mountains? Nowadays the forest reserves are considered our best ranges."

"Yes, *now*. But we thought it mighty poor feed then, compared with our valley."

Mr. Sagers said he stayed on the herding job 8 years. Only once did the farmers do any winter feeding; they hauled out some hay and beets during a very severe winter.

TOOELE VALLEY was first settled about 1847 when a few hardy pioneers pushed their way west from Salt Lake City. As they rounded the north end of a rugged mountain 20 miles from Salt Lake City, a beautiful valley opened up before their eyes. It must have been a paradise to them at that time.

Some 20 miles farther west was a high, beautiful, snow-capped range. To the south about 15 miles was a low cedar-covered mountain. The mountain they had just rounded, running south, was rugged and picturesque as the one to the west. Completing the boundary, the briny waves of the Great Salt Lake lapped lazily against sandy shores on the north.

As the pioneers moved forward through deep luscious grass, herds of nimble antelope frolicked at a safe distance. Every hour they traveled brought new proof of what a real haven they had found. Streams of pure cold water, fed from the high east and west ranges, flowed lazily into a deep fertile valley.

This dust-hazard sign was removed 3 years after establishment of the Grantsville demonstration area. Dust storms formerly brought traffic to a standstill on the main transcontinental highway between Salt Lake City and San Francisco.

It was not long until homes were built along these streams. Winter feed for their horses and oxen was cut from almost any part of the valley the pioneers decided was handiest.

Those pioneers had come a long way to find a home and peace and contentment. There was no craving for power or wealth. And Mr. Sagers goes on to tell the story of the land:

"Perhaps I will never know just why we sons and grandsons did not follow in the footsteps of our wiser forefathers. I do know that we wanted more than the pioneers wanted. We thought running large herds of sheep and cattle was our shortest route to wealth. We gave little thought to the future.

"More and more livestock were turned into these grassy ranges. Twice a year large outside trail herds tramped across the valley, lingering as long as possible to pick up any available feed. Slowly the grass disappeared and sage took its place. Overgrazing stunted and scattered the sage until what was once a range of plenty became almost barren.

"From time to time, hot, destructive brush fires swept through the valley, destroying what little perennial vegatation was left. Ever anxious to increase our income, we plowed up many acres that without irrigation could not yield crops on our less than 12 inches of annual rainfall. The wind whipped up small dust clouds, sending them into the city. Still there was no let-up in the heavy grazing and trampling. Then, to top off man's abuse of the land, there came a drought.

[1] Board of supervisors, Grantsville soil conservation district, Grantsville, Utah.

"In 1934, almost all sign of vegetation was gone. Even ground squirrels and jackrabbits were forced to hunt other range. When the wind blew, it was not just little puffs of dust that rolled by. We went through misery. We ate sand and dust.

"Suffering from the catastrophe was not confined to the 1,200 citizens of Grantsville. Only a few miles away, 5,000-peopled Tooele, and the farming communities of Erda, Lake View, and Lake Point also breathed the dust. Soil from Tooele Valley settled as far away as Salt Lake City, Ogden, and Logan. Idaho got some of Utah's dust.

"You no doubt have seen heavy cloudbursts or snowstorms roll down, darkening the country about you. The dust was ten times worse. Instead of rain or snow, a thick hot dust whirled into our faces as we ran choking for protection. But our houses did not protect us much, for the fine powdery dust knew no barrier. It came through the key holes, window sills, and door frames. Although we tried to plug every possible opening, within a few hours our houses and everything in them had a thin layer of powdery dust.

"One day I got so restless I climbed into my car, turned the lights on, and drove slowly through the whirling dust to the post office.

" 'We ought to give this country back to the Indians,' I told the postmaster.

" 'Humph,' grunted an old Goshute buck. 'Indians no want them. White man spoil them.'

"And so it was; even the Indians did not want what was once a paradise, nor did most of us want it. Penniless and disheartened, we began to look for some place to go, some place else to build another home. Our formerly luxuriantly grassed valley was now barren; it was the Utah Dust Bowl, to put it mildly.

"Then, in 1935, the United States Soil Conservation Service helped us to work out a land-use program to get vegetation back and stop the dust blows, and make the valley productive again.

"The land that the dust was coming from was put under cooperative agreement—in all, 32,000 acres.

The air is much clearer now, in the Grantsville demonstration area. Soil conservation practices in 2 years have brought back a fine cover of perennial ricegrass, sandgrass, needlegrass, and wheatgrass.

Later, in 1938, we organized a soil conservation district under the State law.

"Every method that was practical, and the cost reasonable, was used to get a covering of vegetation on this area. Livestock were removed, and men worked to regain these lands. Early in the spring of 1936, seeds of hardy vegetation were planted. A sturdy fence was put around the project. Dams were built to keep the spring rains from rushing madly away. On the slopes, contour furrows were plowed to hold back the water.

"Fire lanes were made and fire protection diligently practiced. Soon the land began to show signs of life again, and in 1937 only little puffs of dust were to be seen.

"In 1938, the wind blew hard, but the air was clean and fresh. On January 1, 1939, under strict supervision of the Grantsville soil conservation district board, several thousand head of sheep, horses, and cattle were allowed to enter the area for 2 months. The Soil Conservation Service gave technical advice.

"Perhaps next year we may allow more stock and a longer grazing period. There is no doubt in my mind that before long stockmen will get more winter feed from this area than they have in many years past.

"In 1938 when the soil conservation district was formed, a board of five local supervisors began to manage the conservation and land-use program for the landowners. The Soil Conservation Service continued to help the conservation program along through the board of supervisors of the district.

"Now the dust is settled and the grass and feed are high and luscious again, and the local soil conservation district is working hard with the Service technicians. We supervisors are bound to be criticized by stockmen in the district for our conservative plans to see that this area never goes back into a dust bowl.

"We, the local committee, were elected by the people within the dust area. We serve without pay or expense money, but our whole heart is in our job. We want to keep this valley a place that our children and our children's children will be proud to call home.

"In my wanderings over the Western States, I see many places that are slowly but surely being tramped and grazed into dust beds; many sheep grazing on arid lands where only half as many should be; large herds of cattle killing feed within miles of the few desert water holes; sheepmen keeping their herds too long on each bed ground.

"And all for what?

"Along with the Soil Conservation Service, we citizens of Grantsville earnestly hope that our sufferings have been to some avail. We appeal to other Americans to heed the lesson we have learned. The key to soil conservation lies not in cure, but in prevention. Proper land use, if begun in time, can prevent destructive, demoralizing dust storms and serious floods, and will yield a thousandfold in sustained income through conservation of the fertile topsoil. Only minerals should be mined—don't try to mine our soil and plants."

ANOTHER LOOK AT BALK METHOD

(Continued from p. 37)

strip protection at close spacings during the spring, followed by some mulching during the summer. In the fall, repetition of the cycle begins. The best balk vegetation so far tested at the Southern Piedmont Experiment Station is the crimson clover-ryegrass combination. On *average cropland* it seems to require a successive seeding for proper establishment. On *good land*, on a Georgia farm, it has been volunteering for at least 10 years in this method. Unquestionably, the soils have been improved; the sloping lands have been protected to a considerable degree, and summer crop yields are said to have increased gradually during the period.

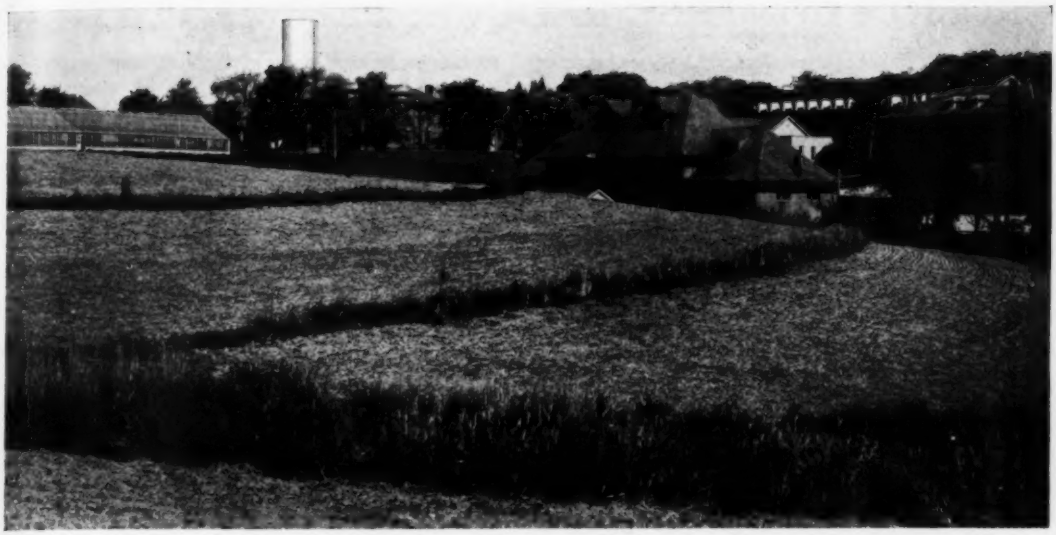
Most southern Piedmont cropland soils are in more or less eroded and depleted condition, due to long continued soil-exhausting clean culture. Hence, it is likely that the repeated use of cover crops, as is possible in the balk method, will gradually bring about better granulation or mellowing of plowland, because of organic accumulation, and will eventually also increase productivity.

It is going to require several years of experimentation to determine the effects of this method upon soils and crop yields. As yet, no quantitative data have been obtained relative to soil and water conservation. Observations made during and after erosive rains indicate that substantial protection is afforded, along with reduced run-off, particularly in the spring months.

WESTERN RANCHES AND WILDLIFE

On less than 20,000 acres of private and State land a ranch near Alamogordo, N. Mex., received $2,800 in 1938, and $4,000 in 1937, for mule deer hunting privileges at $100 per hunter per season. The hunter's fee entitled him to lodging, food, saddle horse, and guide.

In New Mexico a rancher receives $45 a year for duck-shooting privileges on a single pond with a water surface of about 1 acre.



Contour sod buffer strips at the Boys' Industrial School farm, Lancaster, Ohio.

THE STATE COOPERATES

By HAL JENKINS [1]

AN OUTSTANDING EXAMPLE of State cooperation in a land-use program is to be found in Ohio, where the department of welfare has joined forces with the Soil Conservation Service in conserving the soil resources of 21,000 acres of publicly owned farm land.

The program now underway is of particular value as a demonstration because Ohio's welfare institutions are so located that they represent practically every important erosion problem area in the State. And practices on State-owned farms are closely observed by private farmers.

John D. Bragg, chief agriculturist for the welfare department, and D. T. Herrman, State coordinator for the Service, started the ball rolling during 1938.

AS A PRELIMINARY step, a 2-day school for the institutions' farmers and gardeners was held in March 1938, at the erosion experiment station and on the project area of the Service near Zanesville. A similar school was held in March this year at the Apple Creek State Hospital farm, Wayne County. Technicians of the Extension Service and the Soil Conservation Service conducted the school.

To date Mr. Bragg and his farmers and gardeners, assisted by technicians of the Service, have made complete erosion control plans for the State farms at the Apple Creek, Massillon, and Mount Vernon State institutions. Plans are being prepared for the institution farms at Athens, Dayton, Delaware, Lancaster, Lebanon, Lima, London, Macedonia, Mansfield, Marysville, Orient, and Sandusky. As rapidly as possible plans will be completed for all the State farms which have erosion problems.

Mr. Bragg takes a long-range view of the problems of State institution farms. "We realize," he points out, "that it is our job to produce as much foodstuff as possible to enable these institutions to be at least partly self-sustaining; but we also recognize that it is equally important for us to conserve and improve our soil resources because the same need will exist 100 years from now."

A like attitude on the part of the managing officers and agricultural department heads has enabled the welfare institution farms to make unusually rapid progress in the adoption of soil-conservation measures during the past year and a half.

[1] Section of information, Soil Conservation Service, Dayton, Ohio.

EROSION CONTROL REDUCES SEDIMENTATION

STREAMS flowing into the municipal reservoir on Deep River, 4 miles northeast of High Point, N. C., carry 50 percent less sediment today than in 1934. This information was obtained in a recent survey conducted by the Service during a period when rainfall was above normal. Furthermore, cost of filtering water has been decreased, and the life of the reservoir has been extended several years.

In 1934 the Soil Conservation Service, in cooperation with the United States Geological Survey, found that sediment was reducing the storage capacity almost 1 percent a year. The amount of soil accumulating in the reservoir represented a loss of more than a ton of topsoil from each acre of land in the 40,000-acre watershed.

In the summer of that year farmers in the watershed area cooperated with the Service in working out erosion-control programs. Today more than 40 percent of the farmers, occupying most of the land in the watershed area, are working with the Service on a conservation program which includes contour cultivation, terracing, crop rotation, and vegetative control.

It is to these 5 years of conservation practices that technicians of the Service attribute the reduction in loads of silt, soil, and debris carried into the million-dollar lake by tributary streams.

WIND EROSION DAMAGE CHECKED IN NAVAJO LAND

By J. NIXON HADLEY and DAVID ROGERS [1]

KAYENTA, ARIZ., whose post office is farther from a railroad than any other in the United States, has turned out to be the setting for the story of one of the Service's most successful fights against the ravages of wind erosion.

Kayenta lies in the remote, isolated interior of the 16-million acre Navajo Reservation, in northeastern Arizona not far from the southern boundary of Utah.

Here the Navajo Indians graze their sheep and goats and raise little patches of corn and squash. Those Navajos who farm depend on irrigation water from a reservoir which is filled by autumn run-off in nearby Laguna Creek.

OVERGRAZING had left the sandy range practically denuded. There was little grass for soil protection or for forage. Wind, blowing over this bare ground was rapidly turning the area into a series of sand dunes, ruining the farm land and endangering the settlement of Kayenta because of sand movement.

Irrigation ditches from Laguna Creek to the reservoir and from the reservoir to the fields play a large part in this story because year after year they filled as fast as the Navajo farmers could clean them out.

Figures confirm this. In the fall of 1936, 180 workdays by men with teams and 160 workdays by men without teams were required to clean the ditch leading to the reservoir—almost a year of workdays.

The following spring, 380 man-team days and 380 man days—over 2 years of workdays—were needed to clean the ditch from the reservoir to the fields.

ALL IN ALL, the Navajos were about to give up on the ditch cleaning job, which seemed a hopeless waste of work, and abandon the farming area. This would have meant a serious loss to them. Farm land is scarce in the Kayenta country, and the loss of this acreage probably could not have been made up by replacement elsewhere.

But here the picture begins to change for the better.

In the fall of 1937, the area surrounding the ditch was added to the Kayenta demonstration area which had been set up by the Soil Conservation Service in the early days of its operations in the Navajo country.

As part of the soil-erosion-control program, the stock on the adjacent range was reduced to the proper carrying capacity. Sand fences of wire and brush were built to break the wind and check the shifting sand dunes. Large dunes are being stabilized by grass plantings. Trees were planted in critical areas between the dunes to stop, eventually, the force of the wind. Blow holes were crisscrossed with furrows and planted.

And then the ditch job changed.

Results of the erosion-control program showed up as early as the following spring. In the spring of 1938, when the Navajos cleaned the ditch, 380 man-days and only 110 man-team days were needed. This was

[1] Assistant soil conservationist and associate agronomist, respectively, Soil Conservation Service, Gallup, N. Mex.

a saving of two-thirds of the man-team labor with an increase of one-third of the man-days without help of teams—altogether a marked decrease in the total amount of work.

But still more gratifying are the workday figures for the fall cleaning job in 1938. Thirteen days' work by men without teams served to clean the ditch, remove weeds, sand and silt. The saving in labor over 1936 was 180 teamster days and 157 man-days.

The Navajo farmers, in 1936, felt that any amount of work on the ditch was well-nigh useless. Last fall the small amount of labor required was done cheerfully and hopefully, because they felt that the ditch work was not wasted and that they would have an adequate supply of water with which to irrigate their crops.

Thus, a single year's program of range control, together with a few simple structures, put a formerly denuded area well on its way back to recovery. Grass annuals and browse plants are growing; dunes are nearly stabilized; and the irrigation ditches are no longer choked with drifting sand. In addition, the demonstration has changed the attitude of the Navajos of the area from active antagonism to one of accordance with the Soil Conservation Service program.

CHOOSE SUPERIOR LOCUST STANDS

(Continued from p. 32)

production purposes. The identity of stock is, of course, maintained through the production period in the nursery and finally in the field.

In the vicinity of Hartsville, Ind., is located a stand of locust known as the Higby Grove, which, according to results obtained by Dr. Ralph P. Hall of the Division of Forest Tree Insects, Bureau of Plant Industry, exhibits not only desirable growth characteristics but also appears partially resistant to attacks of the locust borer (*Cyllene robiniae*). Other desirable stands are located in the vicinities of Howell, Mich., New Castle, Ind., and Alma and Zanesville, Ohio.

However important other duties may appear to be, time spent in locating good stands for seed collection will be time well spent.

PATTERN FAVORABLE TO WILDLIFE

If the pattern of agriculture—using the term in its broadest sense—as developed on this major portion of the land is favorable to wildlife, then wildlife will be abundant. If the pattern is unfavorable, or only fair, then we shall have wildlife in proportion.

Contour tillage is fundamental to a sound program.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

NATIVE LEGUMINOUS PLANTS OF WISCONSIN. By Norman C. Fassett. University of Wisconsin Press. Madison, 1939.

Here is a book that supplies a long-felt want for an adequate source of material for the identification of legumes. A good key for leguminous plants has been needed for a long time by field men of the Soil Conservation Service; those without library facilities have been unable to identify many of the legumes. According to Dr. Dahl, Section of Agronomy, the keys presented in "Native Leguminous Plants of Wisconsin" should prove very valuable to field men of our Service.

The volume is the result of several years of extremely careful study on the taxonomy, ecology, and distribution over North America of the Leguminosae now growing in Wisconsin without cultivation. It is richly illustrated, with drawings by Dr. R. I. Evans, and photographs made with special camera devices for the outside views and detailed views of living plants and herbarium specimens. Of the many maps showing distribution of the species the author states that "every dot * * * is based on a specimen actually examined by the writer, with the exception of a few species in the Deam herbarium." The final section of the volume, prepared by Catherine Mose, is on the special subject, epidermal outgrowths of the Leguminosae of Wisconsin.

The distribution and migration information makes the book more or less unique and especially useful to the student or the field man working with leguminous plants. Wisconsin is apparently on the margin of the range of the Leguminosae in this country—only five of them were found ranging throughout the State. A large block of southeastern woodland species, about 18 of them, reach their northwestern limit in Wisconsin. A few southern species appear to have invaded the State via the Mississippi River. Several prairie species reach their northeastern limit in Wisconsin, and a few which are usually confined to marine beaches are found on the shores of Lake Michigan and Lake Superior.

The book contains five keys to the Leguminosae, the first of which is an artificial key based on the vegetative characters. It contains about 100 species and is very easily followed. The second and third keys are based on flowers and fruits respectively and carry the plants through to the characters of the genera of which there are about 25. The fourth key is based on seeds. It contains about 35 species and genera. Some of the genera are not divided into species. A fifth key is based on the characters of the epidermal outgrowths.

Brief descriptions of many of the genera and species are given; and their distribution throughout the country, and more particularly throughout the State of Wisconsin, is discussed with special reference to migrational routes and present local habitats. Detailed keys of many of the genera are also included.

The scope of the volume is limited, of course, to the legumes which have been found in Wisconsin, and therefore many of the important and common southern species and several that are found in the East are omitted; enough species are included, however, so that anyone who is interested in the identification of plants will want a copy for his library.

HANDBOOK OF FERTILIZERS, 3d edition. By A. F. Gustafson. New York, 1939.

This concise volume is now brought up to date for the convenience of field men and farmers. It presents authoritative information on the sources, effects, make-up, and uses of the known fourteen elements required for the growth of plants. The author tells first why these elements are necessary to plant nutrition and then follows up with three detailed chapters on the sources and availability of nitrogenous, phosphatic, and potash fertilizer materials. The organic, synthetic, and inorganic ammoniates receive considerable treatment, and a table is used to show the plant-nutrient content of all of these nitrogen-carrying materials. A chapter giving the effects of fertilizers upon various crops and soils is brief but most concise and easily comprehensible. The second half of the book is devoted to the make-up and mixing of fertilizers, and public control of sale and analysis of commercial products used as plant nutrients. The New York fertilizer and lime law is discussed as an example of public demand for accurate analysis and effective mixing to minimize deficiencies. Home mixing of fertilizers is discussed as to advantages and disadvantages. Convenient tables are given to show the availability of materials, how to attain uniformity in mixtures, composition of materials, weights required to supply a unit of plant nutrients, make-up, quantities of material required, and suggestive formulas for home mixing.

Dr. Gustafson gives many helpful suggestions for the purchase and use of fertilizers for various crops and soils and for methods of application. He devotes a special chapter to the subject of liming in relation to the fertilizer practice. Finally, soil organic matter is discussed briefly, and here is found handy information concerning the addition of lime and phosphorus, the use of crop residues and barnyard manures, crop rotations, and green manures. An index is included for convenient reference.

North Dakota Windbreak

Since 1936, Bert Phair, Soil Conservation Service cooperator, 5 miles southeast of Park River, N. Dak., has planted 30 acres of his farm land to trees and shrubs for protection against wind erosion. He estimates that these plantings have increased the value of his farm $1,000 to $1,500.

His main windbreak, about 2½ years old, runs a mile along the north and west sides of that part of his cultivated land which receives the hardest winds. At the end of the 1938 growing season, the center two rows of cottonwood trees averaged 15 to 18 feet in height. Representatives of the Service say that these trees are among the largest found on cooperating farms in the four-State region of the Dakotas, Montana, and Wyoming. Border rows of green ash, Russian olive, box elder, and other adapted species were later planted in 1937, and finished the growing season with good growth and height. They were dwarfed only by the towering cottonwoods. "This past year," Mr. Phair said, "there was no blowing at all for some distance out from the trees. We judged that it was 5 to 10 rods before the wind took hold at all."

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